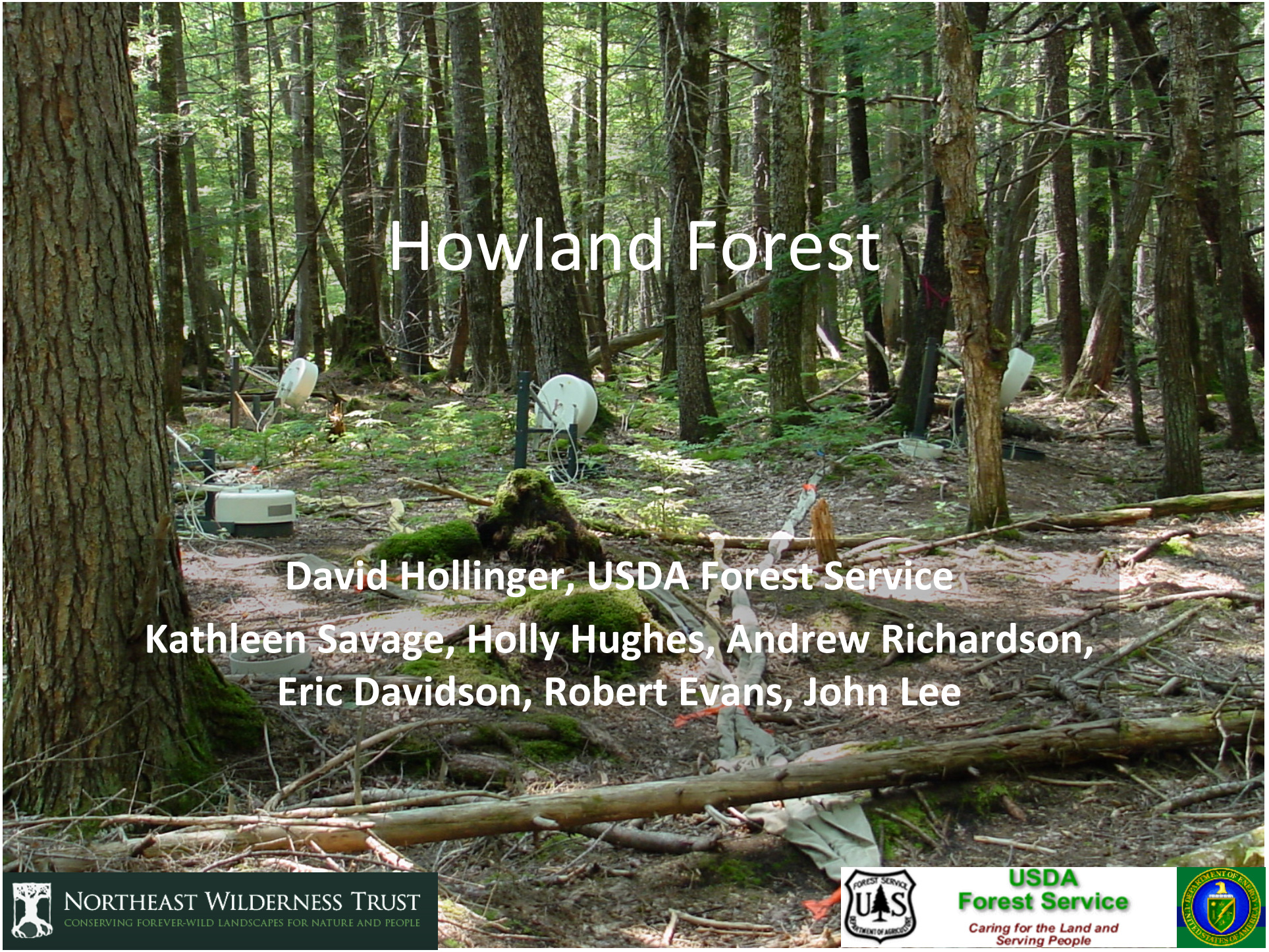

Howland Forest
David Hollinger, USDA Forest Service
Kathleen Savage, Holly Hughes, Andrew Richardson,
Eric Davidson, Robert Evans, John Lee
NORTHEAST WILDERNESS TRUST
CONSERVING FOREVER-WILD LANDSCAPES FOR NATURE AND PEOPLE
USDA
Forest Service
Caring for the Land and
Serving People

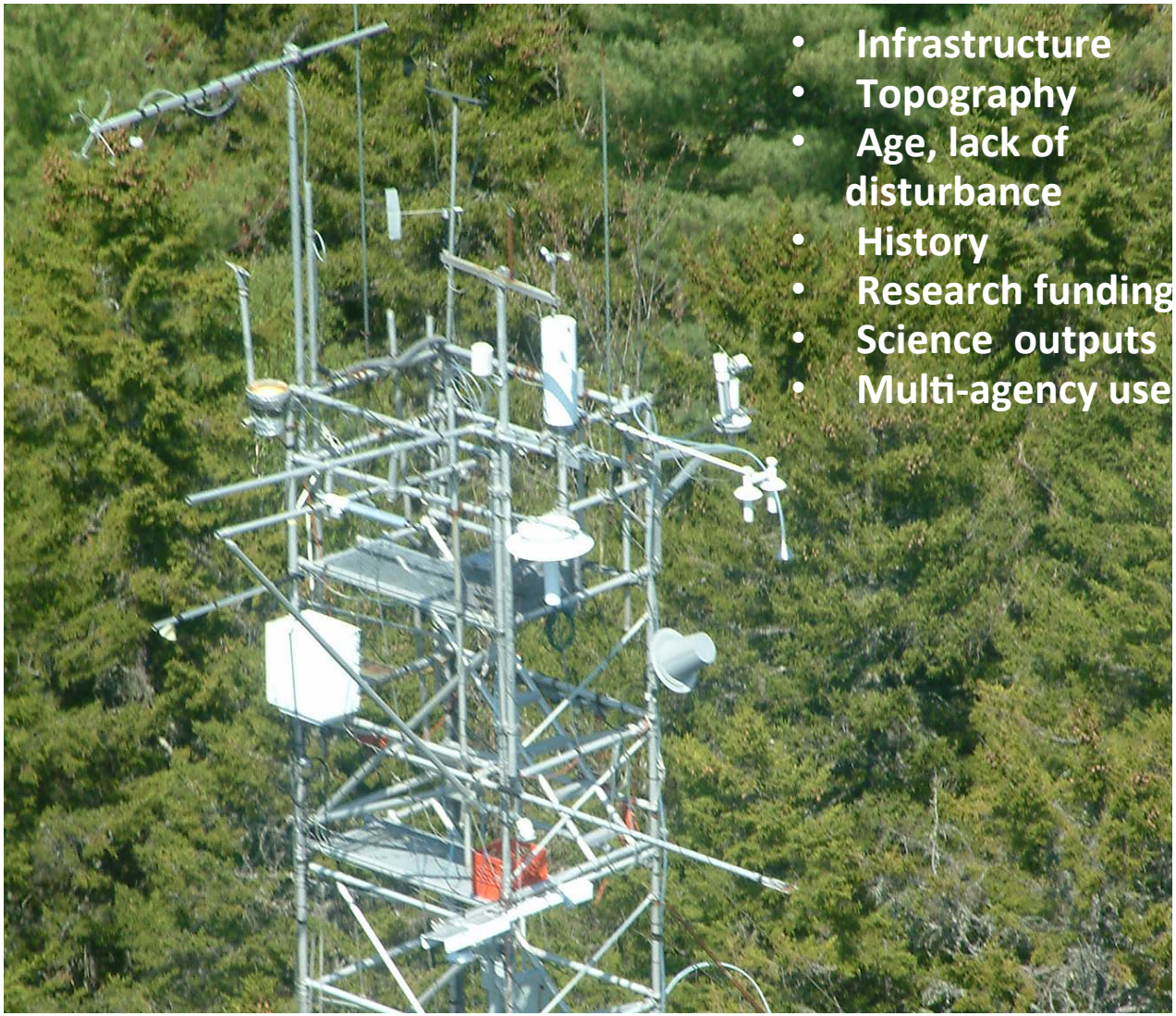

• An old-growth forest is a unique ecological endpoint
• Long-term record of carbon exchange & climatology
• Near optimal conditions for eddy flux studies
• Location at southern ecotone of boreal zone

The Howland Research Forest – present focus is on factors that regulate long term carbon storage

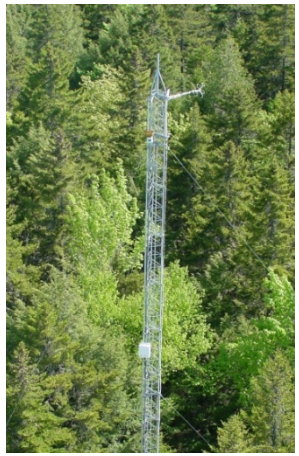
USDA Forest Service
Caring for the Land and Serving People

The Woods Hole Research Center

1865 THE UNIVERSITY OF MAINE

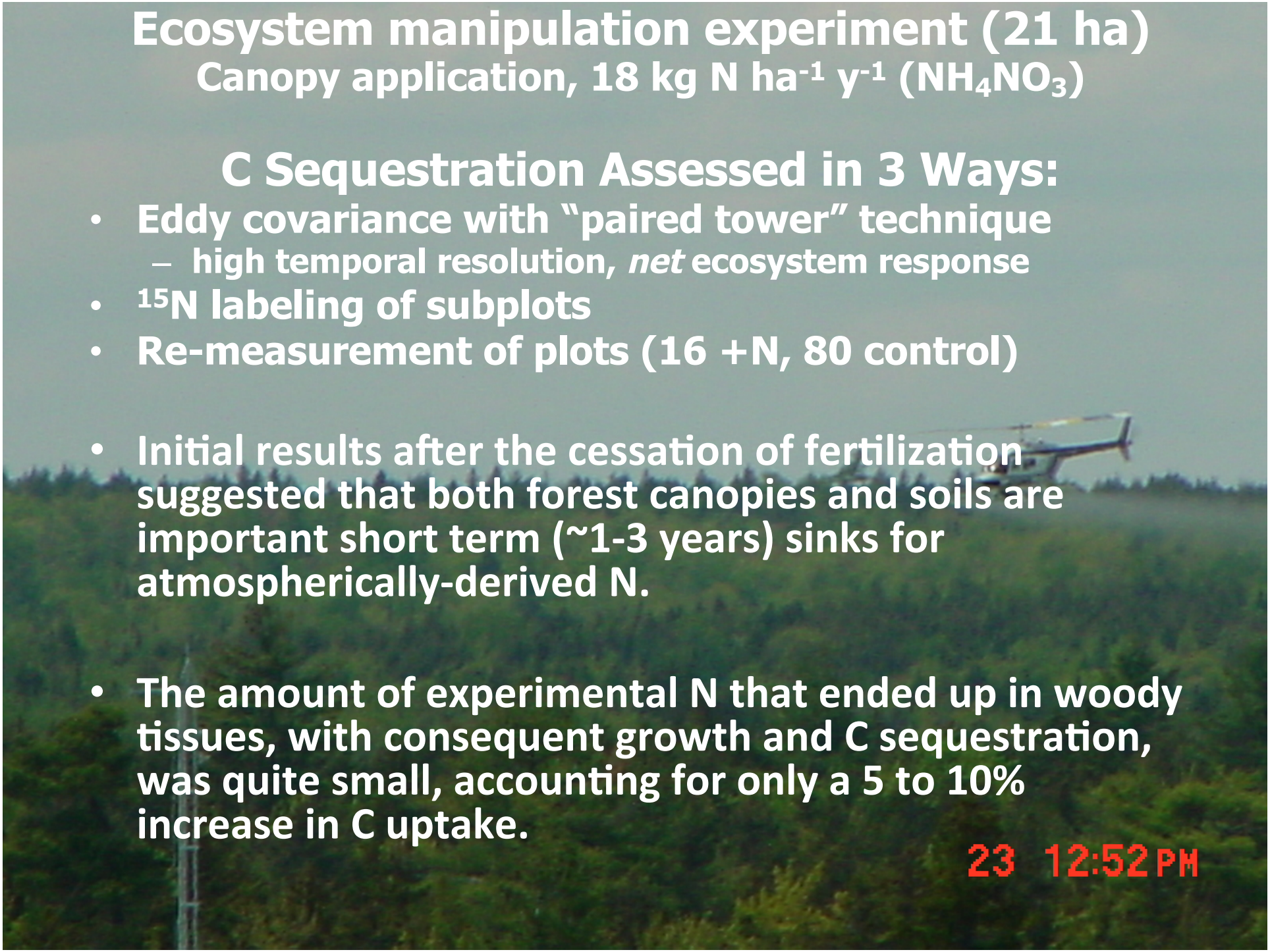


- Infrastructure
- Topography
- Age, lack of disturbance
- History
- Research funding
- Science outputs
- Multi-agency use



Past research at the Howland Forest

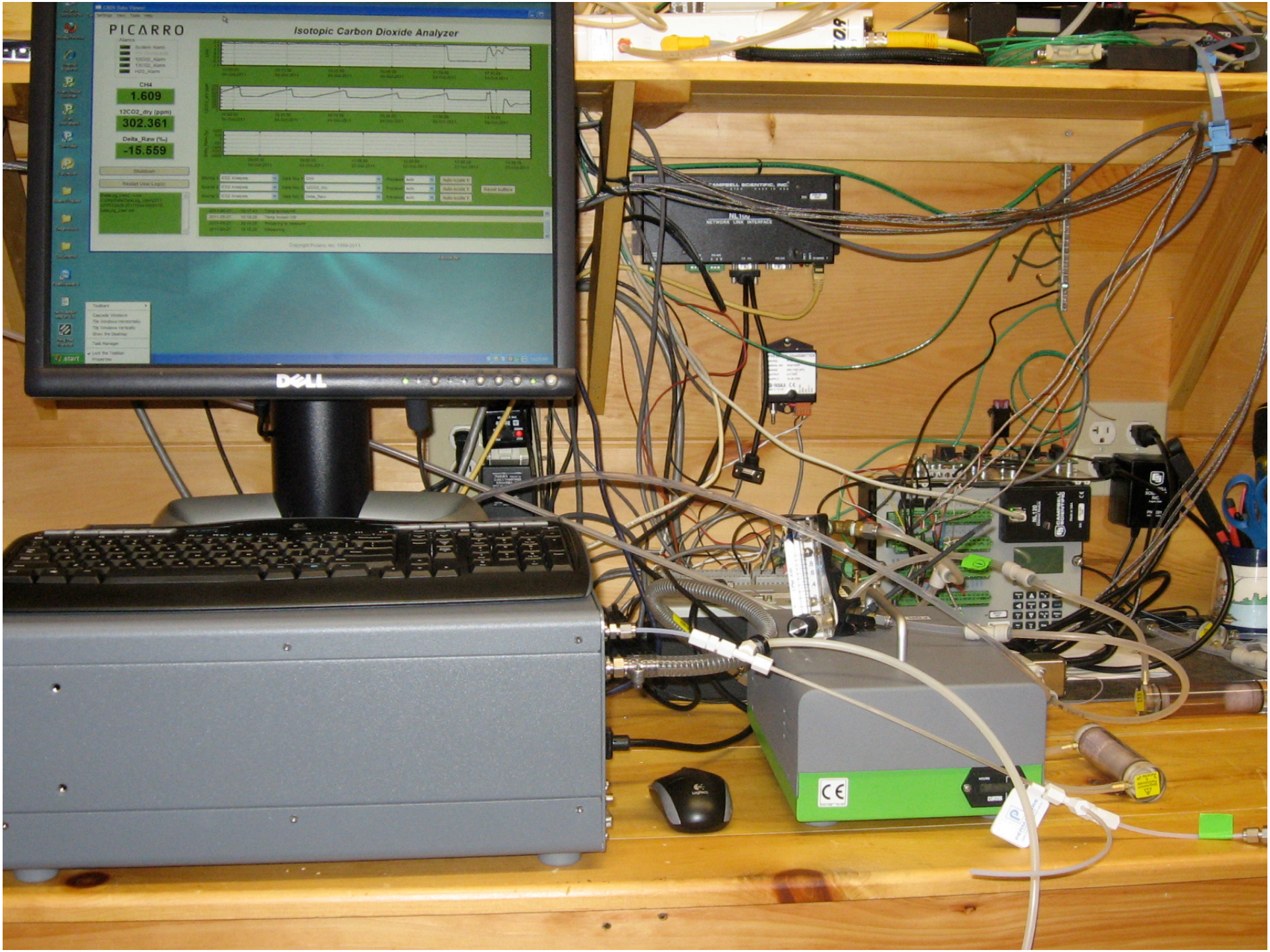
- Nitrogen amendment experiment
- Shelterwood harvest experiment


Ecosystem manipulation experiment (21 ha)
Canopy application, 18 kg N ha^{-1} y^{-1} (NH_4NO_3)
C Sequestration Assessed in 3 Ways:
• Eddy covariance with "paired tower" technique
– high temporal resolution, *net* ecosystem response
• ^{15}N labeling of subplots
• Re-measurement of plots (16 +N, 80 control)
• Initial results after the cessation of fertilization suggested that both forest canopies and soils are important short term (~1-3 years) sinks for atmospherically-derived N.
• The amount of experimental N that ended up in woody tissues, with consequent growth and C sequestration, was quite small, accounting for only a 5 to 10% increase in C uptake.
23 12:52 PM


Howland Forest Harvest, 2001-2
• shelter wood (overstory left, ~90 ft²/acre)
• cut-to-length with harvester (branches left)
• forwarding

Present research at the Howland Forest

- Determine cause(s) of long-term trends in ecosystem C and water exchange
- Understand controls on CH_4 exchange
- Partition carbon exchange with experimental manipulations (trenching), $^{13}CO_2$ and $^{14}CO_2$ measurements
- Estimating Δ (discrimination against $^{13}CO_2$) at various scales to understand ecosystem water use and WUE.


PICARRO
Isotopic Carbon Dioxide Analyzer
CH4
1.609
12CO2_dry (ppm)
302.361
Delta_Raw (‰)
-15.559
DELL
CAMPBELL SCIENTIFIC, INC.
NL100
NETWORK LINK INTERFACE


Trenching
Bobcat
Bobcat

^{14}C trapping inside the equipment building